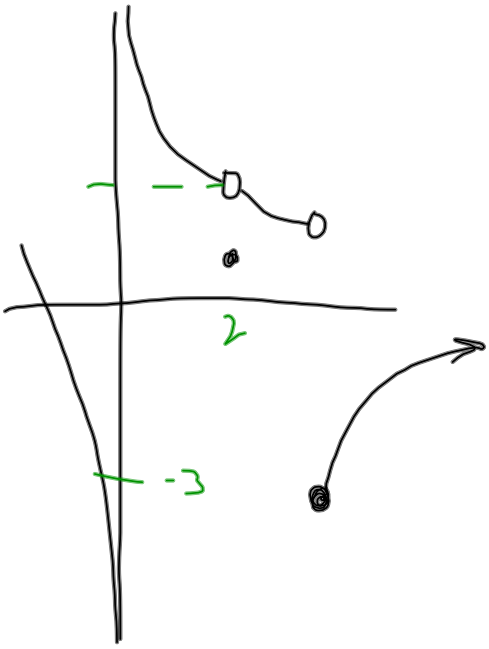


1) $\lim_{x \to 2} f(x) = 3$

2) $\lim_{x \to 4^+} f(x) = -3$

3) $\lim_{x \to 4^-} f(x) = 2$

4) $\lim_{x \to 0} f(x) = \text{dne}$

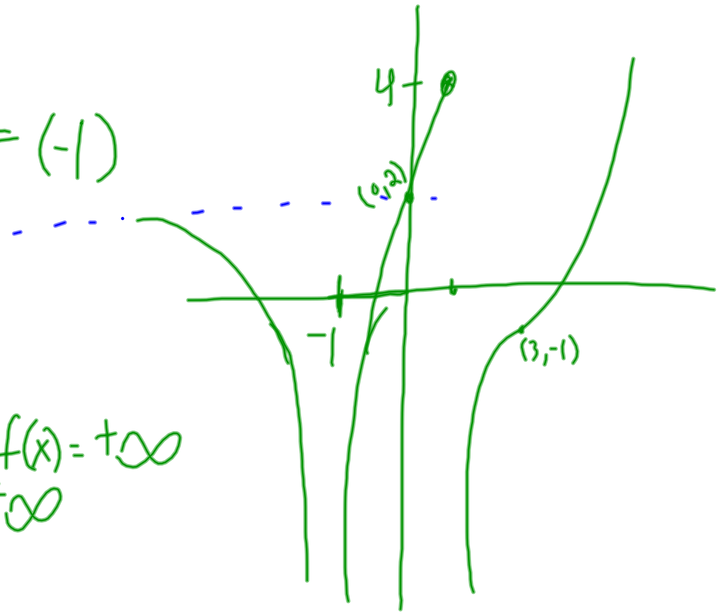
Sep 20-7:17 AM

$f(0)=2 \quad f(3)=(-1)$

$\lim_{x\to(-1)} f(x) = -\infty$

$\lim_{x\to -\infty} f(x)=2 \quad \lim_{x\to +\infty} f(x) = +\infty$

$\lim_{x\to 1^-} f(x)=4 \quad \lim_{x\to 1^+} f(x) = -\infty$



horizontal asymptotes
ARE examples of end behavior.
But
NOT ALL examples
of end behavior
are horizontal asymptotes

7) If the function $f(x)$ is NOT defined at c, then $\lim_{x \to c} f(x)$ can not exist.

8) $\lim_{x \to 2} (-x^2 + 4x) = -(2)^2 + 4(2)$

$-4 + 8 = 4$

RULE: exponents apply to what is RIGHT in FRONT of them

$$-x^2 = -(x)^2 = -(x^2)$$

$$(-x)^2 = +x^2$$

Sep 20-7:28 AM

9) $\lim\limits_{x\to 3} \frac{\sqrt{5x+10}}{x-3}$

$\lim\limits_{x\to 3^-} \frac{\sqrt{5x+10}}{x-3} = -\infty$

$\lim\limits_{x\to 3^+} \frac{\sqrt{5x+10}}{x-3} = +\infty$

DNE

10)

$$f(x) = \begin{cases} x^2 - 3x + 6, & x < 2 \\ -x^2 + 3x + 1, & x \geq 2 \end{cases}$$

$$\lim_{x \to 2^-} f(x) = 2^2 - 3(2) + 6$$
$$= 4$$

$$\lim_{x \to 2^+} f(x) = -2^2 + 3(2) + 1$$
$$= 3$$

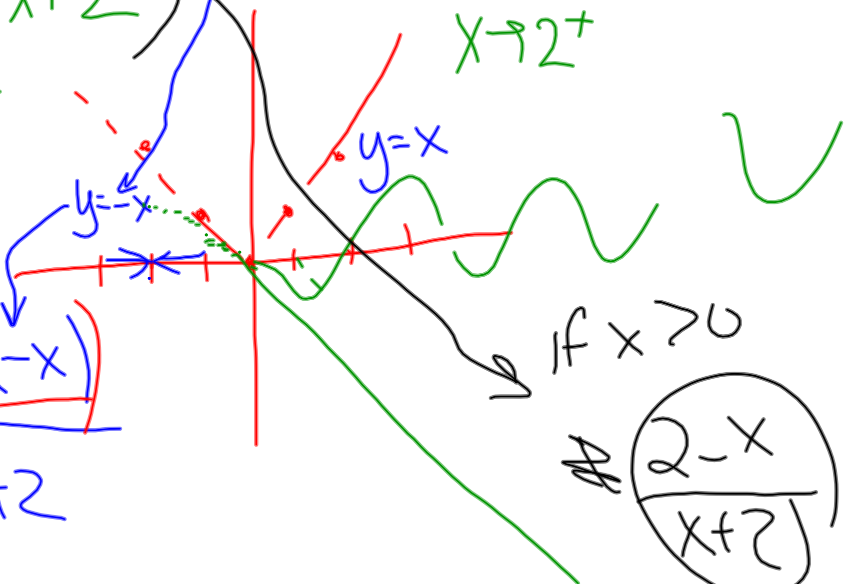
$$\lim_{x \to 2} f(x) = \text{dne}$$

11) $$\lim_{x\to 3} \frac{x^2-2x}{x+1} = \frac{3}{4}$$

12) $$\lim_{x\to -2} \frac{2-|x|}{x+2}$$

$$\lim_{x\to -2^-} \frac{2-|x|}{x+2} \qquad \lim_{x\to 2^+} \frac{2-|x|}{x+2}$$

$y=|x|$



if $x>0$

$$\neq \frac{2-x}{x+2}$$

$$\lim_{x\to -2^-} \frac{2-(-x)}{x+2}$$

$$\lim_{x\to -2^-} \frac{2+x}{x+2} = \lim_{x\to 2^-} 1 = 1$$

Sep 20-7:57 AM

(14) $\lim_{x\to-\infty} \frac{3-2x}{\sqrt{3x^2-7}} = \lim_{x\to-\infty} \frac{x\left(\frac{3}{x}-2\right)}{\sqrt{x^2}\sqrt{3-\frac{7}{x^2}}}$

$= \lim_{x\to-\infty} \frac{\cancel{x}\left(\frac{3}{x}-2\right)}{\cancel{-x}\sqrt{3-\frac{7}{x^2}}}$

$x\left(\frac{3}{x}-2\right) =$

$x\left(\frac{3}{x}\right)-2x = 3-2x$

$= \lim_{x\to-\infty} \frac{\frac{3}{x}-2}{-\sqrt{3-\frac{7}{x^2}}}$

$= \frac{-2}{-\sqrt{3}} = +\frac{2}{\sqrt{3}}$

$\sqrt{a\cdot b} = \sqrt{a}\cdot\sqrt{b}$

[if $a, b \geq 0$]

$\sqrt{a+b} = \sqrt{a}+\sqrt{b}$

RONG

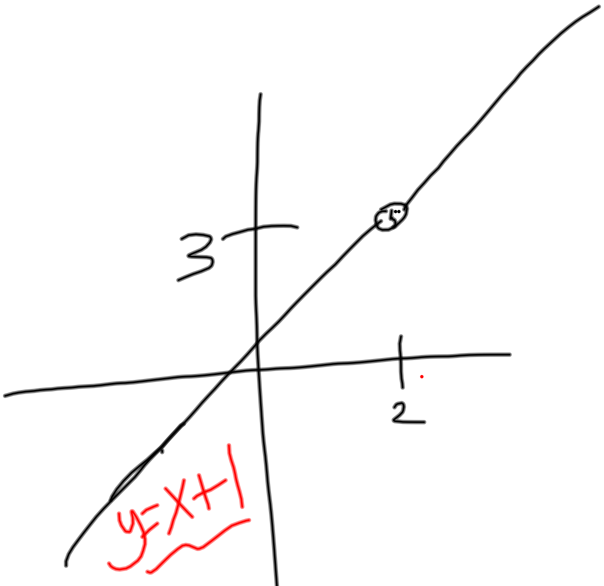
$\sqrt{5} = \sqrt{1+4} = \sqrt{1}+\sqrt{4}$

$= 1+2$

$= 3$

$\sqrt{6} = \sqrt{1+1+4} = \sqrt{1}+\sqrt{1}+\sqrt{4}$

$= 4$



removable discontinuity

=

HOLE

[fill it in with 1 point]

$$\lim_{x \to 2} f(x) = 3$$

$$y = \frac{(x+1)}{1}\left(\frac{x-2}{x-2}\right)$$

$$y = \begin{cases} \sin x, & x \neq 1 \\ 7, & x = 1 \end{cases}$$

$y = \sin x \ \{x \neq 2\}$

3.1/7) $y=\frac{1}{2}x^2$; $x_0=3$, $x_1=4$

a) $avg=\dfrac{\frac{1}{2}(4^2)-\frac{1}{2}(3^2)}{4-3}=\dfrac{7}{2}$

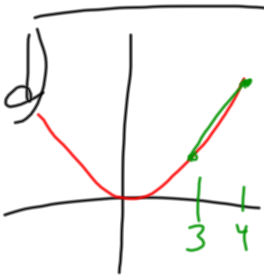
c) $inst=\lim\limits_{x\to x_0}\dfrac{f(x_1)-f(x_0)}{x_1-x_0}$

$=\lim\limits_{x\to x_0}\dfrac{\frac{1}{2}x_1^2-\frac{1}{2}x_0^2}{x_1-x_0}=\lim\limits_{x_1\to x_0}\dfrac{\frac{1}{2}(x_1^2-x_0^2)}{x_1-x_0}$

$=\lim\limits_{x_1\to x_0}\dfrac{\frac{1}{2}(x_1-x_0)(x_1+x_0)}{(x_1-x_0)}=$

$=\lim\limits_{x_1\to x_0}\frac{1}{2}(x_1+x_0)=x_0$

d)



b) inst $=3$

d)

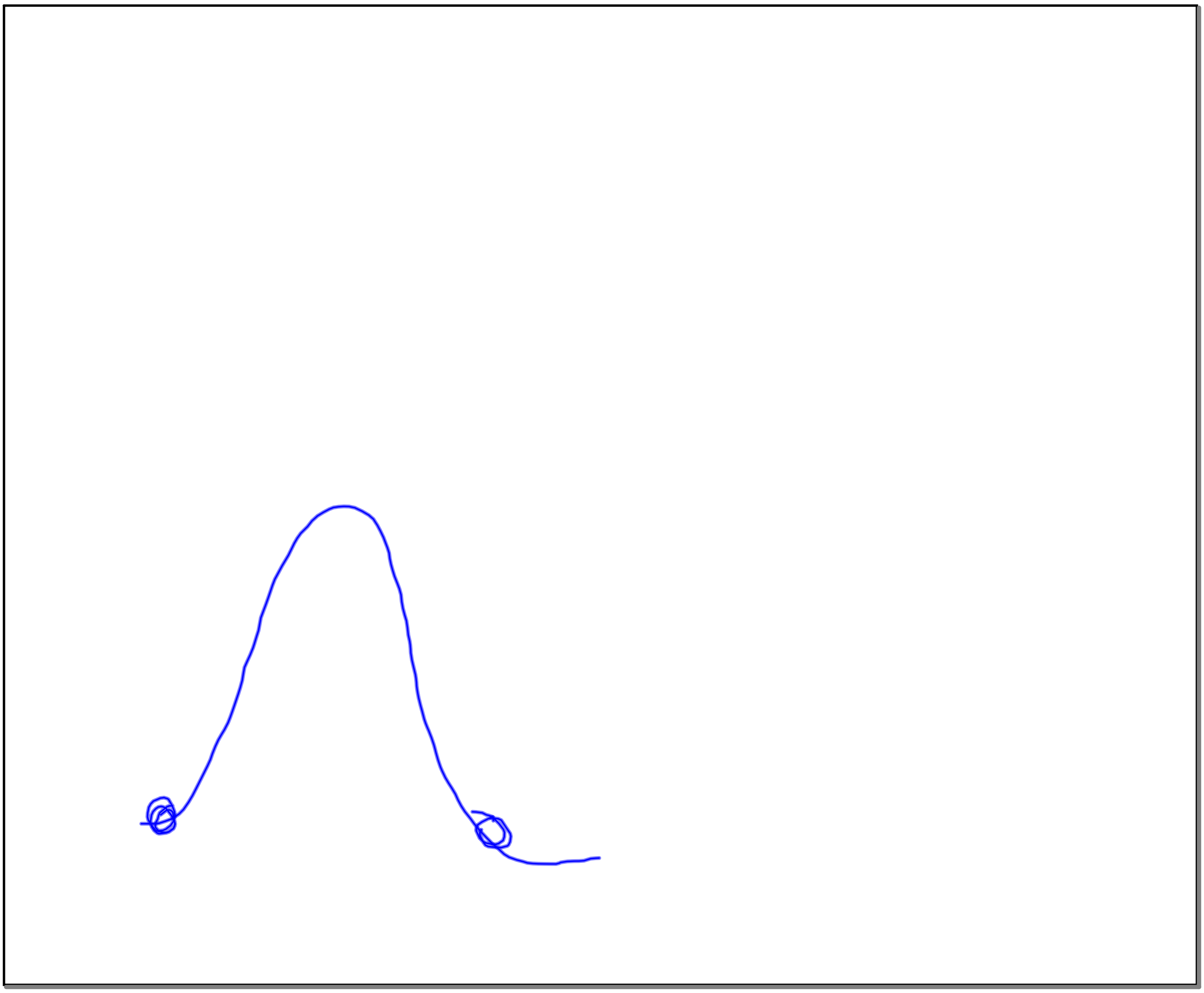
$inst=\lim\limits_{x\to 3}\dfrac{f(x)-f(3)}{x-3}$

$=\lim\limits_{x\to 3}\dfrac{\frac{1}{2}x^2-\frac{1}{2}(9)}{x-3}=\lim\limits_{x\to 3}\dfrac{\frac{1}{2}(x^2-9)}{x-3}$

$=\lim\limits_{x\to 3}\dfrac{\frac{1}{2}\cancel{(x-3)}(x+3)}{\cancel{(x-3)}}$

$=\frac{1}{2}(3+3)=\frac{1}{2}6=3$

Sep 20-8:38 AM



Sep 20-8:38 AM